

Notice of Allowability

Application No.

10/775,432

Examiner

Thanh D. Vo

Applicant(s)

RAO, RAGHAVENDRA J.

Art Unit

2189

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Amendment filed on May 25, 2006 and the telephone interview on July 6, 2006.
2. ☒ The allowed claim(s) is/are 1-7,10-23 and 26-29.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|---|---|
| 1. <input type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input checked="" type="checkbox"/> Interview Summary (PTO-413),
Paper No./Mail Date _____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date _____ | 7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other _____. |

DETAILED ACTION

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it **MUST** be submitted no later than the payment of the issue fee.

2. Authorization for this examiner's amendment was given in a telephone interview with Stephen Curran (Reg. 50,664) on July 6, 2006.

The application has been amended as follows:

1. (Currently Amended) A storage system comprising:

a cache configured to store a plurality of data blocks in a first plurality of locations, wherein said cache is a non-volatile storage;

a first metadata storage including a plurality of entries configured to store metadata including block addresses of data blocks within said cache, wherein said first metadata storage is a non-volatile storage; ~~and~~

a second metadata storage including a second plurality of locations each configured to store metadata including a block address identifying a corresponding data block within said cache and further including a first pointer to said corresponding data block within said cache, wherein said second metadata storage is a volatile storage;

wherein at least one of said second plurality of locations is further configured to store a second pointer to another of said second plurality of locations that stores metadata corresponding to a related data block;

wherein said metadata stored within the second metadata storage is arranged into one or more cache descriptors each associated with a respective data block; and

wherein said one or more cache descriptors are arranged into one or more groups, wherein a given group includes one or more cache descriptors that correspond to contiguous logical block addresses of an underlying storage volume.

8. (Cancelled)

9. (Cancelled)

18. (Currently Amended) A method comprising:

storing a plurality of data blocks in a first plurality of locations of a cache, wherein said cache is a non-volatile storage;

storing within a non-volatile first metadata storage including a plurality of entries, metadata including block addresses of data blocks within said cache;

storing within each of a second plurality of locations of a volatile second metadata storage, metadata including a block address identifying a corresponding data block within said cache and further including a first pointer to said corresponding data block within said cache; and

storing within at least one of said second plurality of locations, a second pointer to another of said second plurality of locations that stores metadata corresponding to a related data block;

arranging said metadata stored within said second metadata storage into one or more cache descriptors each associated with a respective data block; and

arranging said one or more cache descriptors into one or more groups, wherein a given group includes one or more cache descriptors that correspond to contiguous logical block addresses of an underlying storage volume.

24. (Cancelled)

25. (Cancelled)

Reason for Allowance

3. The following is an examiner's statement of reasons for allowance:

With respect to independent claims 1 and 18:

Royer, JR. et al. (US Pub 2003/005219) discloses:

a cache to store plurality of data blocks, wherein the cache is a non-volatile storage (page 2, paragraph 0019, lines 5-7);

a first metadata storage including a plurality of entries configured to store metadata including block addresses of data blocks within said cache, wherein said first metadata storage is non-volatile storage (page 2, paragraph 0019, lines 8-14);

a second metadata storage including a second plurality of locations each configured to store metadata including a block address identifying a corresponding data block within said cache (page 2, paragraph 0025), wherein the metadata can be stored in a volatile storage and the metadata are defined to identify the data blocks stored in the cache. Since the metadata is used to identify the data blocks within the cache, therefore a first pointer pointed to corresponding data block within said cache memory is inherent.

Koseki et al. (US Patent 6,732,124) further discloses:

A metadata pointer contains in a metadata descriptor points to a metadata object/data (See Fig. 12, and col. 16, lines 10-12).

Since Royer, JR et al. and Koseki et al. are from the analogous art, therefore it would have been obvious to one having an ordinary skill in the art at the time of the Applicant's invention to have a metadata pointer from the metadata descriptor to point to another metadata object so that each metadata entries can be linked together to be read in one operation as desired by Royer, JR et al. in Fig. 2 and the abstract lines 4-5.

However, neither Royer, JR et al., Koseki et al., nor prior art records teach wherein the metadata stored within the second metadata storage is arranged into one or more cache descriptors each associated with a respective data block; and wherein said one or more cache descriptors are arranged into one or more groups, wherein a given group includes one or more cache descriptors that correspond to contiguous logical block addresses of an underlying storage volume.

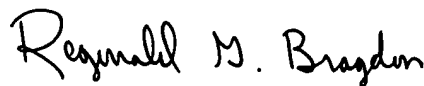
Claim 18 is reciting the limitations that are similar to the allowable subject matter recited in claim 1. Therefore, claim 18 is also patentable over the prior art records.

Claims 2-7, 10-17, 19-23, and 26-29 are also allowable since they depend from their respective allowable independent claims.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."



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07/09/2006



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